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CONTENTS

Stallings and Turner—N. sp. Agathymus and n. subsp. Megathymus 109

Knull—A new subspecies of Cacoplia nebulosa 116

Dreisbach—Two new species of Haploneurion 117

Kormondy—North American records of anisopterous Odonata .. 121

Svihla—Emergence and transformation of Tanypteryx hageni ... 131

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ENTOMOLOGICAL NEWS

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A New Species of Agathymus and a New Subspecies of Megathymus (Lepidoptera, Rhopalocera, Megathymidae)

By DON B. STALLINGS and J. R. TURNER, Caldwell, Kansas

Agathymus freemani new species

FEMALE. Upper surface of primaries: Orange-yellow with an irregular black border along the outer edge of the wing 3 to 6 mm. wide. The base is well overscaled with yellow to yellow-orange hairs and scales. Spots 2, 3 and 4 (subapical spots) and spots 5 and 6 (submarginal spots) appear fused together, being faintly separated by black lines along the veins. Spot 1 (cell spot) and spots 7, 8 and 9 (discal band) appear fused together, being separated by a very thin black line along the veins. The irregular black area beyond the cell spot and behind the subapical spots is thinly joined with the black marginal border between spots 6 and 7. Spots 7 and 8 are about the same length (6 mm.) spot 9 is one mm. shorter. Spots 7, 8 and 9 form a fairly straight line along their outer edge. This line being perpendicular to the base of the wing. The fringes are checkered black and yellow-orange.

Upper surface of secondaries: Orange-yellow with a black border 3.5 mm. wide. The base is well overscaled with yellow-orange scales and hairs. There is a band of black, well overscaled with yellow-orange, inward from the discal band. This band is narrower and has more overscaling towards the anal area. Fringes are checkered black and yellow-orange.

Under surface of primaries: Brown-black with the apex overscaled with white. The spots of the upperside reappear but

are slightly paler, except spots 2 and 3 which are white, or nearly so.

Under surface of secondaries: Brown-black evenly overscaled with white, except for the discal band area which is very distinct and completely overscaled with yellow to yellow-orange with a similar area near the base.

Abdomen golden-brown above, brown-black below. Thorax orange-brown above, gray below. Palpi white with some of the hairs and scales tipped with black. Antennae black with joints barely edged with white.

Wing measurements of holotype: Forewing, apex to base 27 mm., apex to outer angle 15 mm., outer angle to base 21 mm.; hindwing, base to end of vein Cu_1 20 mm.

MALE. Upper surface of primaries: Black with heavy golden-brown overscaling at the base and narrowly outward towards the outer angle. The 9 spots are somewhat smaller than in the female with the colors a deeper golden tone and the spots do not appear to be fused together. Spots 5 and 6 are minute dots. Spot 7 is toothed inwardly and slightly smaller than spot 8. Spot 9 is slightly larger than 8 and the lower half of it (9) is set inward nearly 1 mm. Fringes checkered black and golden-brown.

Upper surface of secondaries: Black with heavy golden-brown overscaling at the base nearly extending out to the discal band of golden-brown, particularly in the anal area. Fringes checkered black and golden-brown.

Under surface of primaries: Brown-black with the apex overscaled with white. The spots of the upper side reappear but are yellow with spots 1, 2, 3 and 4 being paler than the other spots.

Under surface of secondaries: Similar to female.

Abdomen, thorax, palpi and antennae similar to female with the yellow to orange colors being slightly darker in the male.

Wing measurements of allotype: Forewing, apex to base 27 mm., apex to outer angle 15 mm., outer angle to base 18 mm.; hindwing, base to end of vein Cu_1 17 mm. Described from 27 specimens (15 males and 12 females) reared from larvae and

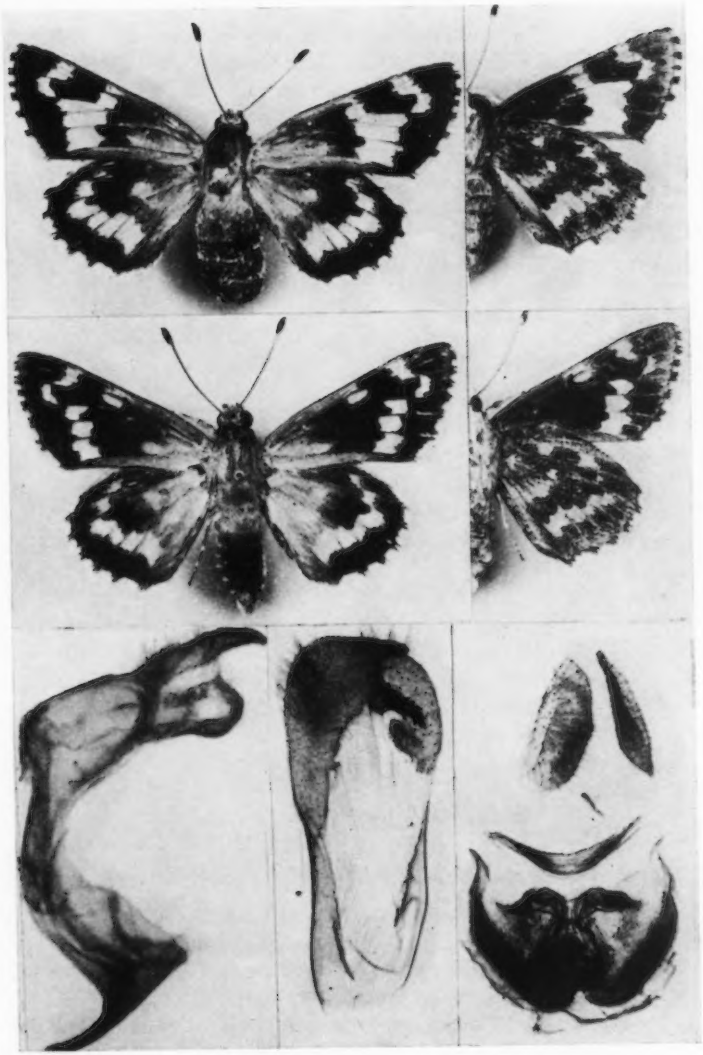

PLATE I, *Agathymus freemani*

Top row: Holotype, upper side to left; under side to right. 2nd row: Allotype, upper side to left; under side to right. 3rd row: Left: ♂ uncus; center: ♂ valva; right: ♀ genitalia.

pupae collected near Bagdad, Ariz. type locality (12 specimens), Hillside, Ariz. (9 specimens), Kirkland, Ariz. (5 specimens), Date Creek, Ariz. (1 specimen). Elevation at type locality 5,000 ft. Specimens emerging from Sept. 8th to Oct. 13th, during 1955, 1957 and 1958. Collected by Dr. and Mrs. R. C. Turner, Dr. J. R. Turner, Viola N. Stallings; Kilian Roever and Lee Miller (Kirkland).

Holotype, female, October 10, 1957 (Turner) and *allotype,* male Sept. 18, 1955 (Turner) are in the collection of the authors. *Paratypes,* a pair each in the collections of H. A. Freeman, Kilian Roever and Lee Miller.

The food plant is locally identified as *Agave deserti.* Actually it is as different from *Agave deserti* of California as this species of *Agathymus* is from *Agathymus stephensi* (Skinner) which feeds on the California plant. (It will be interesting to trace this food plant towards the California plant and see what happens, both in the plants and the insects.) This species is probably closest to *Agathymus baueri* (Stallings & Turner) but is instantly distinguished from *A. baueri* by the distinct discal band on the lower secondaries. *Agathymus stephensi* has a discal band on the lower secondaries but the spots on the upper surfaces are somewhat different in their arrangement and are a pale yellow to chalky white compared to the rich yellow-orange color of *A. freemani.* It will be noted that the cucullus of the male valva is extremely bent. We have deliberately pictured an extreme example of this situation to call attention to this character.

This species is named in honor of our good friend, H. A. Freeman, whose work in this particular group is well known.

Megathymus yuccae browni Stallings & Turner, new subspecies.

FEMALE. Upper surface: Primaries blackish brown becoming dark brown near outer margin. There is a little grey just beneath the apex, with only a trace of light brown hairs near the base. Spot 1 (cell spot) broadly squarish and yellow. There are three faint linear spots above spot 1. Spots 2, 3 and

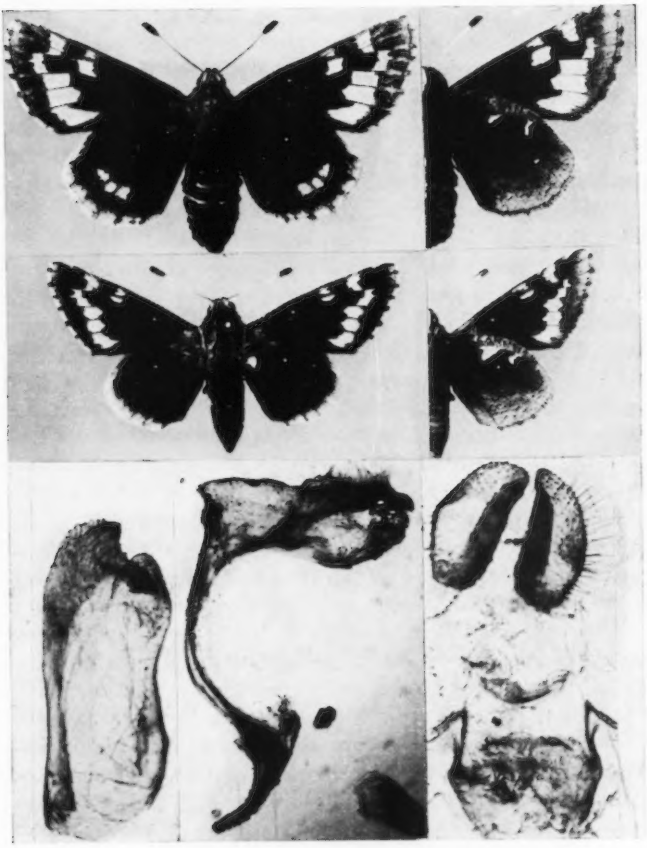

PLATE II, *Megathymus yuccae browni*

Top row: Holotype, upper side to left; under side to right. 2nd row: Allotype, upper side to left; under side to right. 3rd row: Left: ♂ valva; center: ♂ uncus; right: ♀ genitalia.

4 (subapical spots) are white and rather broad, 2 mm. wide. Spots 5 and 6 (submarginal spots) are pale yellow and almost square. Spot 7 of the discal band is yellow and broadly rectangular, 3.5 mm. wide. Spot 8 of the discal band is yellow and of the same shape but wider, 4 mm. Spot 9 of the discal band is yellow and very broad, tapering into a fine point towards the base of the wing, 6 to 7 mm. wide. Fringes checkered black and grey. Secondaries: Blackish brown with only the very slightest indication of lighter hairs near the base. Spots 10 and 11 fused together into an irregularly shaped spot which is slightly basal from spot 12. Spot 12, round, 2 mm. wide. Spot 13 somewhat square, 2 mm. wide. All three spots are yellow. There is a greyish yellow marginal border with the veins distinctly brown-black, 2.5 mm. wide. Fringes checkered, black and greyish yellow.

Under surfaces: Primaries, dark brown, except below the apex which is grey. All spots reappear with spots 2, 3, 4, 5 and 6 white, remainder pale yellow. Secondaries, brownish grey with the grey lighter near the costa and outer margin. There are two greyish-white spots below the costal area. These are somewhat broadly linear and crescentic in shape. Most specimens have a white spot encircled by brown near vein Cu_1, in the discal area.

Abdomen blackish brown above, lighter beneath. Thorax brownish grey above, brown beneath. Palpi sordid white. Antennal club black above, greyish beneath, the remaining portion grey ringed with brown. Expanse of forewing varies from 23 to 29 mm., average 27 mm. Wing measurements of holotype: Forewing, apex to base 29 mm., apex to outer angle, 18 mm., outer angle to base, 19 mm. Hindwing, base to end of vein Cu_1, 21 mm.

MALE. Upper surface: Primaries black becoming black-brown near the outer margin. There are some yellowish hairs near the base. Spot 1 oblongly linear and very pale yellow. There are three linear spots above it. Spots 2, 3 and 4 are linear and semi-hyaline. There is a tendency for a minute spot to develop above spot 2. Spot 5 creamy white and broadly

crescentic. Spot 6 creamy white and somewhat squarish, its inner side situated at about the center of spot 7. Spots 7, 8 and 9 yellow with spot 7 rectangular, with its inner and outer sides rounded, 3 mm. wide. Spot 8 similar to spot 7. Spot 9 prolonged inward into a fine point and very broad, 5 mm. wide. Fringes checkered brown and grey. Secondaries similar to female, but without spots 10, 11, 12 and 13.

Under surface: Primaries brownish black except the outer margin which is grey. Spots 1 through 6 are white. Spots 7, 8 and 9 pale yellow. Secondaries similar to female.

Abdomen, thorax, palpi, and antennae similar to female. Expanse of forewing varies from 19 to 24.5 mm., average 24 mm. Wing measurements of allotype: Forewing, apex to base, 24 mm., apex to outer angle, 15 mm., outer angle to base, 16 mm. Hindwing, base to end of Cu_1, 16 mm.

Described from 12 specimens, 5 males and 7 females collected by Don B., Jack, Dee, and Viola Stallings and Dr. and Mrs. J. R. Turner near Salina, Utah, in the pupal stage.

Holotype ♀, Salina, UTAH, VI–12–51 (Stallings & Turner) and *allotype* ♂, VI–8–51, same locality and collectors are in the collection of the authors. One pair of paratypes are in the collection of H. A. Freeman, others will be distributed later.

Considered with the type series, but not made a part thereof, were 28 specimens from the north rim of the Black Canyon of the Gunnison River in the Black Mesa country of Colorado. We were able to check the speed of one male which flew 42 miles per hour.

Food plant: *Yucca harrimaniae* Trelease.

We name this subspecies in honor of our good friend, F. Martin Brown, who has aided us materially in our studies in Colorado.

The nearest subspecies to *browni* are *navajo* and *coloradensis*. Maculation and genitalia indicate that it is closer to *navajo*. In coloration it is lighter than *navajo* and darker than *coloradensis*. Its spots are larger than *navajo* but smaller than *coloradensis*. Spot 9 of both sex will distinguish it immediately from both.

A New Subspecies of Cacoplia nebulosa (Hald.) (Coleoptera: Cerambycidae)

By Josef N. Knull, Department of Zoology and Entomology, The Ohio State University, Columbus 10

The following form appears to be at the edge of the known distribution of *Cacoplia nebulosa nebulosa* (Hald.) and differs sufficiently to warrant a subspecific name.

Cacoplia nebulosa albata n. subsp.

Size and form of a large *C. nebulosa nebulosa* (Hald.). Background throughout blackish brown which gives the insect appearance of a black ground color. Clothed with short recumbent gray pubescence on both surfaces. Antennae annulate from third to tenth segments inclusive.

Length 13.5 mm.; width 3.6 mm.

Holotype male labeled Mobile, Alabama, May 25, 1952, W. Rosenberg collector, in collection of author.

Superficially this subspecies resembles *Saperda inornata* Say, however, it is larger and longer. It can easily be separated by its dark ground color from *C. nebulosa nebulosa,* which has a light brown background throughout.

Two Additional New Species in the Genus Haploneurion (Hymenoptera: Psammocharidae) from Chile with a Key to the Known Species

By R. R. Dreisbach, Midland, Michigan

When Dr. Reed, of Chile, received the reprint of my first paper on this genus [1] he wrote the writer and said that all his collections from Chile are at the Academy of Science at San Francisco, California. Dr. Leach at my request sent me 21 specimens of this genus, 8 of which represented two new species that are herewith described.

Haploneurion niger, n. sp.

Holotype female: The sides of thorax from base of wings to the middle coxae and from there to apex of thorax, the apex of dorsal surface of propodeum, and the whole abdomen, black; the black of thorax is dull, that of abdomen shining; the rest of the body, including all parts of the legs, is rufous; when seen from in front the vertex rises in a smooth curve above and behind the eyes, the temples rather large; eyes slightly convergent above; ratio of interocular distance at clypeus is 120 compared to 95 at vertex; interocular distance at widest part of head is 0.6 the transfacial distance; clypeus is 2.3 as wide as long; a hairless head as wide as long; clypeus in front rather strongly arched and does not project under eyes; ratio of lengths of first four joints of antennae is 55:20:80:40; second and third antennal joints slightly longer than vertex width; first two joints of antennae reddish yellow as rest of head but from the third joint of antennae dark on dorsal surface and ventral surface becoming darker toward apex; ocelli slightly farther apart than their diameter, and the lateral ones are 3.0 as far from eyes as from each other; pronotum strongly angulate on posterior border; ratio of lengths of pronotum, mesonotum, scutellum, postscutellum, metapostnotum, and propodeum is 40:60:40:10:20:120; golden, shining, prostrate pubescence on clypeus and face,

[1] Dreisbach, R. R. Ent. News, vol. LXIX, no. 8, 1958.

a very few longer hairs on clypeus, head, on coxae, and more hairs on apical rounded last tergite and on all ventral segments; some prostrate pubescence on head and pronotum; wings yellow, hyaline, darkened beyond second cubital cell; second recurrent vein meets the second cubital cell at apical fifth; the second intercubital vein is strongly arched just before meeting radius but the second cubital cell is still as long on radial vein as on cubitus; basal vein in fore wings basad of transverse vein slightly more than 1.5 the length of latter; ratio of lengths of joints of posterior legs beginning with femora is 275:275:200:100:70:40; length of head and thorax 5.0 mm., abdomen 4.6 mm., fore wing 4.0 mm., rear wing 3.6 mm.

Holotype female: Francura, CHILE, Jan. 15, 1951, E. P. Reed (Calif. Acad. Sci., San Fran., Calif.).

Paratypes: 1 Termas, Rio Blanco, Chile, Mar. 28, 1928, E. P. Reed (Calif. Acad. Sci.).

1 Chile, 1932, E. P. Reed (Cal. Acad. Sci.).

1 Temaco, Chile, Jan. 20, 1923, E. P. Reed (R. R. Dreisbach).

Haploneurion reedi, n. sp.

Holotype female: The sides of thorax back of pronotum, the metapostnotum, the slope of propodeum, the first tergite (except narrow posterior edge), second tergite partly mottled, basal 0.75 of third tergite, and basal half of fourth tergite, black; rest of body and all of legs rufous; when seen from in front vertex rises above and behind eyes in a smooth curve; temples rather large; eyes convergent above, the interocular distance at clypeus and vertex is in ratio of 120:95; interocular distance at widest part of head is 0.6 the transfacial distance; clypeus 2.4 as wide as long; head as long as wide; ratio of lengths of first four and last two antennal joints is 50:20:90:70:60:60; golden, shining, prostrate pubescence on clypeus and face (very dense, not so dense or heavy on front), vertex, all of thorax, over all of first and second tergite (in certain light center of second tergite looks dark), on apical 0.75 of third tergite (in certain light), and some on posterior part of fourth and fifth tergites; wings light yellowish hyaline, no dark tip; second recurrent

vein meets second cubital cell at apical 0.2; second intercubital vein concave inward and curving forward so that second cubital cell is only 0.75 as long on radial vein as on cubitus; basal vein in forewing basad of transverse vein by 1.5 the length of the latter; ratio of length of joints of posterior legs (starting with femur) is 300:300:210:100:80:50; length head and thorax 5.3 mm., abdomen 6.0 mm., forewing 5.3 mm., rear wing 4.5 mm.

Holotype female: CHILE, E. P. Reed (Calif. Acad. Sci.).

1 *Paratype:* Chile, E. P. Reed (R. R. Dreisbach).

1 *Paratype:* Valdivia, Chile, X-16-49, E. P. Reed (Calif. Acad. Sci.).

1 *Paratype:* Chile, E. P. Reed (Calif. Acad. Sci.).

1 *Paratype:* Los Muermos, S. Chile (Forest), 1–19–51, Ross and Michelbacher (Calif. Acad. Sci.).

The scale used in the comparative measurements in the two descriptions is 100 div. = 1.325 mm.

The last species is named in honor of Dr. E. P. Reed, of Chile, whose collections from that country have been deposited at the California Academy of Science at Golden Gate Park, San Francisco, California.

KEY TO GENUS HAPLONEURION KOHL—FEMALES

1. Abdomen completely black; thorax all black or only the sides beyond base of wings black.....2
1. Abdomen not completely black, mostly yellowish with more or less black; coxae never black.....3
2. Both thorax and abdomen completely black; coxae and trochanters black, rest of legs yellow; wings black; second recurrent vein meeting the median vein just barely apicad of the second intercubital vein.....*minus* Kohl
2. The whole prothorax, and the dorsum of rest of thorax yellow to about middle of posterior slope of propodeum; the sides black from below fore wing to the apex and the apical half of posterior slope is a dull black, abdomen a bright shining black; wing yellow to apex of first cubital cell, from there to apex the wing is much darkened; coxae, trochanters and all rest of legs bright yellow; the second recurrent vein meeting second cubital cell about apical 0.25.....*niger* n. sp.
3. Brilliant, glistening, golden patches of pubescence on outside of fore coxae, sides of pronotum, dorsal surface of propodeum,

central apex of first tergite, spots on sides and apices of tergites two and three, on sides of propodeum just above second and third pair of coxae, and the clypeus and sides of face; wings completely yellowish; metapostnotum very long, one-half length of propodeum; mesopleura, propodeum and ventral part of thorax black; second recurrent vein meets the second cubital cell much beyond middle of cell but not as far out as apical fifth.....*apogonum* Kohl

3. The brilliant, glistening, golden patches of pubescence of *apogonum* not present; metapostnotum not nearly as long as in preceding species.....4
4. Ocelli less than their diameter apart and the lateral ones *ten times* as far from eyes as each other; third antennal joint longer than the first or fourth; distance between the eyes at vertex equal to the length of second and third antennal joints; basal vein in fore wings basad of transverse vein by three times length of latter; second recurrent vein meets second cubital cell at apical fifth; second and third tergites with prostrate golden pubescence.....*bullocki* Dreisbach
4. Ocelli about their distance apart and the lateral ones about *three times* as far from eyes as each other; if prostrate pubescence on second and third tergites it is thin, not strongly golden and not very noticeable.....5
5. Third tergite shining, no pubescence; second recurrent vein meeting second cubital cell at apical third; second cubital cell about two-thirds as long on marginal vein as on cubital vein; basal vein in fore wings is basad of transverse by two times length of latter.....*nitidus* Dreisbach
5. Third tergite not shining but pubescent, wild golden pubescence; second recurrent vein meeting second cubital cell at apical 0.25 or less.....6
6. Second cubital cell almost as long on marginal vein as on cubitus; second recurrent vein meeting second cubital cell at apical 0.15 to becoming interstitial; golden pubescence on face and clypeus not strongly shining, and no golden brilliant reflection on second and third tergite; apical edge of fore-wig darkened; third and fourth antennal joints equal in length.....*chilensis* Dreisbach
6. Second cubital cell only a little more than 0.67 as long on marginal vein as on cubitus; second recurrent vein meeting second cubital cell about apical 0.2; face, clypeus, and third tergite (on apical 0.75) with brilliant golden reflection as well as outer edges of second tergite (in certain reflection); apical edge of fore wing not darkened; third antennal joint longer than fourth.....*reedi* n. sp.

New North American Records of Anisopterous Odonata

By Edward J. Kormondy, Oberlin College, Ohio

Study of the Williamson-Kennedy Odonata collection of the University of Michigan Museum of Zoology has revealed a number of new North American records. The status of each record was based on distribution reported by Needham and Westfall (1955) and in the subsequent studies by Bick (1957), Bick and Bick (1957), Gloyd (1958), and Kormondy (1957a, 1957b, 1958). In the course of the study, some fifteen hundred specimens were determined; among these specimens and those previously studied there are 120 state records for eighty-three species of Anisoptera. Many of these records extend known ranges whereas others merely fill in existing gaps; unusual data are discussed below.

It is of more than passing interest to note that eighty-one of the state records are from west of the Mississippi River, and that fifty-four are from west of the 100th meridian; almost all of the specimens were collected by non-odonatists. Certainly, critical zoogeographic problems, such as species replacement and subspecific validity, let alone a host of ecological problems, cannot be expected to be resolved until students of the group work as diligently in the southwest and northwest as some have done in the eastern portion of the country.

Suborder Anisoptera

Petaluridae

Tachopteryx thoreyi (Hagen). Virginia: Fairfax Co., Great Falls, 6/16/10, W. T. Davis, 1 ♂.

Cordulegasteridae

Cordulegaster maculatus Selys. West Virginia: Monogalia Co., 1 ♂.

Gomphidae

Dromogomphus spinosus Selys. VIRGINIA: Giles Co., Mountain Lake, 8/26/44, J. S. Rogers, 1 ♂; Wythe Co., Wytheville, 6/26–27/35, C. Ahrens, 2 ♂, 1 ♀.

D. designatus Hagen. NEW MEXICO: Eddy Co., 8 mi. W. of Malago, 7/22/35, I. J. Cantrall, 1 ♀. VIRGINIA: Fairfax Co., Great Falls, 7/12/15, F. Chestnut, 1 ♂, 1 ♀.

Erpetogomphus lampropeltis Kennedy. ARIZONA: Cochise Co., Huachuca Mts., mouth of Miller Canyon, 7/23–28/32, J. R. Dice, 17 ♂; Gila Co., Tonto Creek, 8/31/35, I. J. Cantrall, 1 ♂. Previously reported only from California and Texas.

Gomphoides albrighti Needham. NEW MEXICO: Grant Co., 7/2/13, C. Dury, 1 ♂. Previously reported only from Texas.

Gomphus cornutus Tough. IOWA: Blackhawk Co., Waterloo, 6/7/06, N. Miller, 1 ♀.

G. externus Hagen. NORTH DAKOTA: Cass Co., Fargo, R. C. Osburn, 6/2/01 1 ♂, 6/4–7/02 1 ♂, 1 ♀; Traill Co., Caledonia, 7/30/01, R. C. Osburn, 1 ♂, 1 ♀.

G. (Stylurus) intricatus Hagen. COLORADO: Mesa Co., Grand Junction, 7/7/01, R. C. Osburn, 1 ♂.

G. lineatifrons Calvert. WEST VIRGINIA: Randolph Co., Elkins, 6/18–26/35, C. Ahrens, 3 ♂, 3 ♀.

G. lividus Selys. WEST VIRGINIA: Randolph Co., Elkins, 6/19/35, C. Ahrens, 1 ♂.

G. (Stylurus) notatus Rambur. GEORGIA: Floyd Co., Rome, Coosa River, 7/13/30, C. F. Byers, 2 ♂.

G. (Stylurus) scudderi Selys. TENNESSEE: Fentress Co., Allardt, 1,600 ft., 8/19/22, T. H. Hubbell, 1 ♂. Omitted by error from Kormondy, 1957a.

G. (Stylurus) spiniceps (Walsh). GEORGIA: Rabun Co., Chattooga River, 9/18/32, E. B. Williamson *et al.*, 1 ♂, 1 ♀.

G. submedianus Williamson. IOWA: Muscatine Co., near Fairport, Patterson Lake, 7/28/16, C. B. Wilson, 1 ♂.

G. ventricosus Walsh. IOWA: Blackhawk Co., Waterloo, 6/7/06, N. Miller, 1 ♀. NEW HAMPSHIRE: Cheshire Co., ¼ mi. N. of Massachusetts State Line, Connecticut River,

7/4/39, J. Bailey, 1 ♂. Iowa is the westernmost record for this species.

Hagenius brevistylus Selys. WEST VIRGINIA: Randolph Co., Elkins, 6/19/35, C. Ahrens, 1 ♂, 1 ♀.

Lanthus albistylus (Hagen). OKLAHOMA: Adair Co., 2 mi. W. of Stilwell, 6/17/37, W. F. & F. A. Blair, 1 ♀. WEST VIRGINIA: Randolph Co., Elkins, 6/18–23/35, C. Ahrens, 1 ♂, 1 ♀. Oklahoma is the westernmost record for this species.

Ophiogomphus severus Hagen. NEW MEXICO: Arroyo, Pecos River, 7/21/02, Oslar, 1 ♂; Colfax Co., 3.7 mi. E. of Therma, Eagle Lake, headwaters of Cimarron Canyon, 1,000 ft., 9/12/35, T. H. Hubbell, 1 ♀; Sandoval Co., Jemez Mts., August 1909, 1 ♂. New Mexico is the southeasternmost record for this species.

Aeshnidae

Aeshna canadensis Walker. NEBRASKA: Thomas Co., Sand Hills, Nebraska National Forest, 1928, R. McCain, 1 ♂.

A. constricta Say. IDAHO: Shoshone Co., Kellogg, 7/29/36, V. E. Jones, 1 ♂.

A. eremita Scudder. COLORADO: Boulder Co., Ouzel Lake, Rocky Mt. National Park, 7/28–29/34, C. C. Roys, 3 ♂, 1 ♀. MONTANA: Flathead Co., Echo Lake, V. E. Jones, 1 ♂, 2 ♀.

A. interrupta interna Walker. CALIFORNIA: Siskiyou Co., Mount Shasta, July 1932, 1 ♂. IDAHO: Bannock Co., Pocatello, 10/6/36, V. E. Jones, 1 ♀; Idaho Co., Nezperce National Forest, "Beaver Pond," a tributary of Fall Creek, 20 mi. W. of Elk City, 8/1/53, 1 ♂ and Cove Camp, 10 mi. SE of Grangeville, 7/4/53, 1 ♀, K. Lems. MONTANA: Flathead Co., Echo Lake, V. E. Jones, 1934, 2 ♂. WYOMING: Arizona Creek, 8/1/28, A. Murie, 1 ♀.

A. palmata Hagen. MONTANA: Flathead Co., Echo Lake, 8/7–13/35, V. E. Jones, 4 ♂, 4 ♀. WYOMING: Arizona Creek, 8/1/28, A. Murie, 1 ♂; Teton Co., Jackson Hole, 9/14/38, 21 ♂, 2 ♀ and Moose, 9/10–18/38, 13 ♂, 4 ♀, F. M. Gaige.

A. umbrosa occidentalis Walker. IDAHO: Bannock Co., Pocatello, 8/27/36, V. E. Jones, 1 ♂; Bear Lake Co., Montpelier, 7/28/34, E. Brodkorp, 1 ♂; Idaho Co., Nezperce National Forest, "Beaver Valley," a tributary of Fall Creek, 20 mi. W. of Elk City, 8/1/53, 1 ♂, and 8/25/53, 2 ♂, K. Lems.

Anax junius (Drury). ARKANSAS: Drew Co., 7/18/36, L. H. and D. E. Bridwell, 1 ♀. DISTRICT OF COLUMBIA: Eastern Branch, 7/3/14, R. P. Currie 1, ♂. WEST VIRGINIA: Greenbrier Co., Lewisburg, 6/25/35, C. Ahrens, 1 ♂, 1 ♀.

Boyeria vinosa (Say). WISCONSIN: Sauk Co., Lone Rock, J. D. Hood, 7/29/06 1 ♂, 8/12/06 1 ♀.

Gynacantha nervosa Rambur. GEORGIA: Thomas Co., Thomasville, August 1948, R. Griffith, 4 ♀. OKLAHOMA: LeFlore Co., Ouachita Nat'l Forest, 1 mi. NW of Page, 9/15/35, T. H. Hubbell, 1 ♂. This species was previously reported in continental United States only from California and Florida.

Nasiaeschna pentacantha (Rambur). ARKANSAS: Lincoln Co., 6/15/36, L. H. Bridwell, 1 ♂. VIRGINIA: Princess Anne Co., County Creek, north landing, 8/18/48, R. L. Hoffman, 1 ♂.

Corduliidae

Macrominae

Didymops transversa (Say). VIRGINIA: Giles Co., Mountain Lake, 6/25/35, C. Ahrens, 4 ♂. WISCONSIN: Sheboygan Co., Rhine, 7/19/13, F. C. W., G. T., H. R., 1 ♀.

Macromia georgina (Selys). TENNESSEE: Hardeman Co., Bolivar, 8/30/35, H. K. Gloyd, 2 ♂. This record in addition to that of *Gomphus scudderi* (*antea*) brings the known odonate fauna of Tennessee to 105 species (see Kormondy, 1957a).

M. margarita Westfall. GEORGIA: Lumplin Co., 18 mi. N. of Dahlonega, 7/2/39, F. S. Barkalow, Jr., 1 ♂. Reported previously only from North Carolina.

M. taeniolata Rambur. OKLAHOMA: Myes Co., 6/20/36, W. F. Blair, 1 ♀.

Cordulinae

Cordulia shurtleffi Scudder. MONTANA: Flathead Co., Echo Lake, 6/16–20/36, V. E. Jones, 4 ♂.

Epicordulia princeps (Hagen). WISCONSIN: Sauk Co., Lone Rock, J. D. Hood, 7/29/06 1 ♂, 8/12/06 1 ♂.

Helocordulia uhleri (Selys). PENNSYLVANIA: Fayette Co., Ohio Pyle, 6/25/1900, E. B. Williamson, 1 ♂; Somerset Co., Rockwood, 6/29/1900, E. B. Williamson, 2 ♂.

Neurocordulia molesta (Walsh). KANSAS: Pottawatome Co., Manhattan. From Kansas Agri. College Coll., [Thru C. H. Kennedy], 1 ♀. Previously determined as *N. obsoleta* but not reported from Kansas (see Kennedy, 1917b).

Somatochlora filosa (Hagen). MISSOURI: Carter Co., E. B. Williamson *et al.*, 7/29/30 1 ♀, 8/5/30 1 ♂. Missouri is the westernmost record for this species.

S. minor Calvert. IDAHO: Idaho Co., Elk City, 7/16/36, V. E. Jones, 1 ♂, 1 ♀ and "Beaver Ponds," tributary of Fall Creek, 20 mi. W. of Elk City, 7/25/53, K. Lems, 2 ♂. Idaho is the westernmost record for this species in the United States.

S. semicircularis (Selys). IDAHO: Idaho Co., Nezperce Nat'l Forest, Cove Camp, 10 mi. SE. of Grangeville, K. Lems, 7/5/53 6 ♂, 1 ♀ and 7/12/53, 1 ♀.

Tetragoneuria cynosura (Say). WEST VIRGINIA: Tucker Co., Parsons, 6/23/35, C. Ahrens, 2 ♂.

T. semiaquea (Burmeister). NEW YORK: Suffolk Co., Long Island, Deep Pond, Wading River, 5/13/13, W. T. Davis, 1 ♂.

T. stella Williamson. MISSISSIPPI: Adams Co., Natchez, 3/12/55, R. R. Dreisbach, 1 ♀. This record is from the personal collection of Dr. Dreisbach, of Midland, Michigan.

Libellulidae

Brachymesia furcata (Hagen). CALIFORNIA: Riverside Co., Lake Elsinore, 9/14/30, L. K. Gloyd, 1 ♂. Known in the U. S. previously only as far west as Texas and as far east as Florida.

Brechmorhoga mendax (Hagen). ARIZONA: Gila Co., Tonto Creek, 8/31/35, I. J. Cantrall, 2 ♂; Santa Cruz Co., Nogales, 9/23/23, J. H. Williamson, 2 ♂. NEW MEXICO: Eddy Co., 20 mi. W. of Hope, 8/5/31, H. M. Smith, 1 ♀.

Celithemis elisa (Hagen). ARKANSAS: Drew Co., 7/12–18/36, L. H. and D. E. Bridwell, 1 ♂.

C. fasciata Kirby. WEST VIRGINIA: Randolph Co., Elkins, 6/18–21/35, C. Ahrens, 2 ♂.

C. monomelaena Williamson. VIRGINIA: Fairfax Co., Great Falls, 7/18/15, R. P. Currie, 1 ♂. Virginia is the southeasternmost record for this species.

Dythemis velox Hagen. GEORGIA: Lee Co., 8/17/32 1 ♀ and Muckalee Creek, 8/16/32, E. B. Williamson *et al.*, 1 ♂. Georgia is the easternmost record for this species.

Erythemis collocata (Hagen). IDAHO: Bannock Co., near Inkom, Marsh Creek, 9/15/35, V. E. Jones, 1 ♂, 1 ♀. OREGON: Harney Co., Borax Creek, near Fields, 7/27/34 1 ♀, and Little Trout Creek, 7/26/34 1 ♂, C. L. Hubbs.

E. simplicicollis (Say). ARKANSAS: Baxter Co., 3 mi. W. of Baxter-Fulton Co. line on U. S. 62, 8/26/54, T. H. Hubbell and I. J. Cantrall, 1 ♂; Lincoln Co., 7/14/36, L. H. and D. E. Bridwell, 1 ♂.

Erythrodiplax umbrata (Linnaeus). ARKANSAS: Drew Co., 7/12–18/36, L. H. and D. E. Bridwell, 1 ♂.

Ladona julia (Uhler). IDAHO: Idaho Co., Nezperce Nat'l Forest, "Beaver Valley," tributary of Fall Creek, 20 mi. W. of Elk City, 8/1/53, K. Lems, 3 ♂. UTAH: #58, E. M. Legard, 1 ♀.

Leucorrhinia hudsonica (Selys). MONTANA: Flathead Co., Echo Lake, 6/16–20/36, V. E. Jones, 5 ♂, 1 ♀. WYOMING: Teton Co., Teton Nat'l Forest, Jenny Lake, 7/4/32, A. Murie, 1 ♂.

L. proxima Calvert. COLORADO: Boulder Co., Allens Park, 7/23/34, C. C. Roys, 1 ♂, 1 ♀.

Libellula auripennis Burmeister. ARKANSAS: Drew Co., 7/12–18/36, L. H. and D. E. Bridwell, 2 ♂. OKLAHOMA: LeFlore Co., Ouachita Nat'l Forest, 1 mi. NW. of Page,

9/15/35, T. H. Hubbell, 1 ♂. The Oklahoma record seemed to be of interest inasmuch as Bick (1957) reports this species only from Muskogee Co.

L. comanche Calvert. NEVADA: Churchill Co., Dixie Valley, 8/2/38, F. V. Hubbs, 3 ♂; Clark Co., 7 mi. W. of Moapa, 7/12/38, F. V. Hubbs, 1 ♂; Humboldt Co., Mud Meadow Creek, 7/17/42, C. L. Hubbs and family, 1 ♂, 1 ♀. NEW MEXICO: Eddy Co., 8 mi. W. of Malago, 7/22/35, I. J. Cantrall, 1 ♂. OREGON: Harney Co., warm spring on desert on road from Willow Creek to Trout Creek, 7/26/34, C. L. Hubbs and family, 3 ♂, 1 ♀. Oregon is the northwesternmost record for this species.

L. flavida Rambur. ARKANSAS: Logan Co., 1 mi. S. of Paris, 8/28/54, T. H. Hubbell and I. J. Cantrall, 1 ♀.

L. forensis Hagen. NEW MEXICO: Arroyo, Pecos River, 7/27/03, 1 ♀ and no date, 1 ♂; Rio Grande River, Oslar, 7/13/02, 1 ♀ and no date, 1 ♀; Bernalillo Co., Albuquerque, July 12, Oslar, 1 ♂.

L. incesta Hagen. MARYLAND: Prince Georges Co., Hyattsville, 7/29/15, R. P. Currie, 1 ♂.

L. luctuosa Burmeister. COLORADO: Prowers Co., Lamar, 8/24/25, F. M. Gaige, 1 ♂. Colorado is the northwesternmost record for this species.

L. nodisticta Hagen. ARIZONA: Apache Co., 13 mi. N. of Springerville, 7/1/38, F. V. Hubbs, 1 ♂.

L. pulchella Drury. IDAHO: Idaho Co., Riggins, 7/15/36, V. E. Jones, 1 ♂ and "Beaver Pond," tributary of Fall Creek, 20 mi. W. of Elk City, 8/1/53, K. Lems, 1 ♂; Kootenai Co., Medimont, 7/25/36, V. E. Jones, 1 ♂, 1 ♀; NORTH DAKOTA: Nelson Co., Pond south of Stump Lake, 7/24/19, F. Wilcox, 1 ♂; Rolette Co., Turtle Mts., E. shore of Lake Upsilon, 7/17/19, F. Wilcox, 2 ♂. SOUTH DAKOTA: Washabaugh Co., 7 mi. S. of Kadoka, Fountainprick Creek, 7/12/34, L. C. Stuart, 8 ♂.

L. quadrimaculata Linnaeus. MONTANA: Flathead Co., Echo Lake, V. E. Jones, 6/20/36 2 ♂ and 1 ♀, 8/10/35 1 ♂, no date 1 ♂. NORTH DAKOTA: Traill Co., Caledonia, 5/28/00, R. Osburn, 1 ♂, 1 ♀.

L. (Belonia) saturata Uhler. NEW MEXICO: Chaves Co., Roswell, 5/30/18, P. Williamson, 1 ♂; Lincoln Co., stagnant pool beside Rio Bonito, 4 mi. NW. of Lincoln, 7/3–10/37, J. R. Dice, 3 ♂; Otero Co., Cornudas Mts., 7/1/31, L. K. Gloyd, 1 ♂, 1 ♀.

L. vibrans Fabricius. ARKANSAS: Lincoln Co., 7/8/31, L. H. Bridwell, 1 ♂.

Nannothemis bella (Uhler). MARYLAND: Prince Georges Co., Hyattsville, R. P. Currie, 5/22/15 1 ♂, 8/5/15 2 ♂ and 2 ♀.

Pachydiplax longipennis (Burmeister). NEW MEXICO: Otero Co., Cornudas Mts., 6/28–7/1/31, L. K. Gloyd, 5 ♂, 1 ♀.

Pantala hymenea (Say). ARKANSAS: Desha Co., near Dumas, 1930, L. H. Bridwell, 1 ♀; Lincoln Co., 7/8–9/31, L. H. Bridwell, 2 ♀ and 7/16/36, L. H. and D. E. Bridwell, 1 ♂, 1 ♀.

Perithemis seminole Calvert. LOUISIANA: Orleans Par., New Orleans, Audubon Park, 5/19/09, 1 ♀. Louisiana is the westernmost record for this species.

Plathemis lydia (Drury). DISTRICT OF COLUMBIA: Pond, Hamilton Hill, 7/3/14, R. P. Currie, 1 ♂. SOUTH DAKOTA: Washabaugh Co., 7 mi. S. of Kadoka, Fountainprick Creek, 7/12/34, L. C. Stuart, 1 ♂.

P. subornata Hagen. OREGON: Harney Co., Borax Creek, 7/27/34, C. L. Hubbs, 1 ♂. Oregon is the northwesternmost U. S. record for this species.

Sympetrum (Tarnetrum) corruptum (Hagen). NORTH DAKOTA: Benson Co., Bird Island, Devils Lake, 8/8/19, 2 ♂, Coulee II from Minnewaukan, 7/11/19, 2 ♂, Fort Totten Lake, 8/7/19, 2 ♂, Wood lake, west of Tokio, 7/25/19, 1 ♂, 1 ♀, F. Wilcox.

Perithemis tenera (Say). ARKANSAS: Lincoln Co., 6/15/36, L. H. Bridwell, 2 ♂.

Sympetrum costiferum (Hagen). IDAHO: Bannock Co., Pocatello, fish hatchery, 10/6/36, 1 ♀, and Topaz, 9/13/36, 1 ♂, 1 ♀, V. E. Jones. MINNESOTA: Beltrami Co., Lavinia, 8/21/49, P. B. Kannowski, 1 ♀; Koochiching Co., Rainy Lake, 8/19/32, S. E. Moore, 1 ♂, 1 ♀. NORTH DAKOTA: Benson Co., Minnewaukan, Coulee near town, 7/11/19, F.

Wilcox, 1 ♀; Bottineau Co., Lake Carpenter, 12 mi. W. of Lake Upsilon, Turtle Mts., 7/16/19, 1 ♂, Lake Metagoske, east of Bottineau, 7/16/19, 1 ♀, Gravel Lake, Turtle Mts., 7/15/19, 1 ♀, F. Wilcox; Ramsey Co., Sweetwater Lake, 9/10/19, F. Wilcox, 2 ♂, 13 ♀. WYOMING: Teton Co., Moose, September 1938, F. M. Gaige, 3 ♂, 1 ♀.

S. danae (Sulzer). MONTANA: Flathead Co., Echo Lake, V. E. Jones, 1 ♂. NORTH DAKOTA: Rolette Co., Lake Upsilon, Turtle Mts., 7/18/19, F. Wilcox, 1 ♀. WISCONSIN: Oneida Co., Roosevelt, Moen Lake, 7/21/13, F. C. W., G. T., H. R., 1 ♀.

S. internum Montgomery. CONNECTICUT: Tolland Co., Union, 8/15–29/38, E. R. Andrulot, 7 ♂. IDAHO: Bannock Co., Pocatello, 8/27/36, 1 ♀ and Topaz, 9/13/36, 1 ♂, 1 ♀, V. E. Jones; Bear Lake Co., Bern, 8/10/35, 1 ♀ and 3 mi. SE. of Montpelier, 7/16/34, 2 ♂, E. Brodkorp. IOWA: Appanoose Co., Mine Pond near Centerville, 9/10/32, 2 ♂ and Perjue Lake, 9/18/33, 6 ♂, 1 ♀, J. W. Leonard; Woodbury Co., Sioux City, 8/1/02, A. G. Ruthven, 1 ♂. MASSACHUSETTS: Middlesex Co., Shirley, 7/23/39, E. M. Davis, 3 ♂, 2 ♀; Worcester Co., Lunenberg, 8/19/34, E. M. Davis, 3 ♂. MONTANA: Flathead Co., Echo Lake, V. E. Jones, 1 ♂, 1 ♀; Glacier Co., St. Mary's, Glacier Park, 8/8–9/27, A. Murie, 2 ♀. WISCONSIN: Oneida Co., Roosevelt, North of 4th Lake, 7/22/13, 4 ♀ and Roosevelt, between 4th Lake and Hobson, 7/22/13, 1 ♂, 1 ♀ and Roosevelt, Moen Lake, 7/23/13, 1 ♀, F. C. W., G. T., H. R. WYOMING: Park Co., Sheep Creek, 8/5/99, E. B. Williamson, 2 ♀; Teton Co., Jackson, A. Murie, 7/11/32 1 ♀, 8/21/32 2 ♂, 1 ♀.

S. obtrusum Hagen. MONTANA: Flathead Co., Echo Lake, 8/7/35, V. E. Jones, 3 ♂, 3 ♀. California, omitted by error in Needham and Westfall (1955), is listed by Kennedy (1917a) and represented by a large series in this collection.

S. occidentale fasciatum Walker. NORTH DAKOTA: McKenzie Co., Grassy Butte, 8/8/37, N. A. Weber, 2 ♂, 1 ♀. North Dakota is the northeasternmost record for this species.

S. pallipes (Hagen). ARIZONA: North rim of Grand Canyon, Greenland Lake, 7/31/33, C. J. D. Brown, 3 ♂, 1 ♀. IDAHO:

Bannock Co., Pocatello, 10/3/36, 1 ♂ and Topaz, 9/13/36, 1 ♂, 1 ♀, V. E. Jones; Bear Lake Co., Montpelier, E. Brodkorp, 7/5/34 1 ♂, 8/12/35 1 ♀; Clearwater Co., Elk River, 7/16/36, V. E. Jones, 1 ♂; Kootenai Co., Medimont, 8/1/36, V. E. Jones, 1 ♂; Shoshone Co., Enaville, 7/26/36, V. E. Jones, 1 ♂, 1 ♀. WYOMING: Teton Co., Moose, 9/10/38, F. M. Gaige, 1 ♂, 1 ♀. Specimens from Wyoming and Idaho have the tibiae black. The relationship between this species and *S. obtrusum* Hagen appears to need study.

S. rubicundulum (Say). NOVA SCOTIA: Picton, Simpson's Pond, 7/24/89, W. Sheraton, No. 10, 1 ♂.

Tramea lacerata Hagen. ARKANSAS: Desha Co., near Dumas, 1930, L. H. Bridwell, 1 ♀; Logan Co., 1 mi. S. of Paris, 8/28/54, T. H. Hubbell and I. J. Cantrall, 1 ♂. NEW MEXICO: Lincoln Co., 4 mi. NW. of Lincoln, 7/10/37, J. R. Dice, 1 ♀; Otero Co., Cornudas Mts., 6/29/31, L. K. Gloyd, 1 ♂.

T. onusta Hagen. COLORADO: Prowers Co., Lamar, 8/25/25, F. M. Gaige, 1 ♂.

LITERATURE CITED

BICK, G. H. 1957. The Odonata of Louisiana. Tulane Studies in Zoology, 5(5): 71–135.

——, and J. C. BICK. 1957. The Odonata of Oklahoma. Southwestern Nat., 2(1): 1–18.

GLOYD, L. K. 1958. The dragonfly fauna of the Big Bend region of Trans-Pecos, Texas. Occ. Pap. Mus. Zool. Univ. Mich., 593: 1–23.

KENNEDY, C. H. 1917a. Notes on the life history and ecology of the dragonflies (Odonata) of Central California and Nevada. Proc. U. S. Nat. Mus., 52(2192): 483–635.

——. 1917b. The Odonata of Kansas with reference to their distribution. Bull. Univ. Kansas Biol. Ser., 18: 129–145.

KORMONDY, E. J. 1957a. New knowledge of the Odonata of Tennessee. Jour. Tenn. Acad. Sci., 32(2): 106–115.

——. 1957b. Records of Western Odonata with notes on *Amphiagrion abbreviatum* (Selys). Jour. Kansas Ent. Soc., 30(3): 108–110.

——. 1958. Catalogue of the Odonata of Michigan. Misc. Pub. Mus. Zool. Univ. Mich., 104: 1–43.

NEEDHAM, J. G., and M. J. WESTFALL, JR. 1955. A Manual of the Dragonflies of North America (Anisoptera). Berkeley: Univ. Calif. Press, pp. xii + 615.

Emergence and Transformation of Tanypteryx hageni Selys (Odonata)

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Numerous nymphs of the rare western North American dragonfly, *Tanypteryx hageni* Selys, were seen to emerge and transform at Tipsoo Lake, Mount Rainier National Park, Washington, during the last week of July 1959. The site where these nymphs occur has been described in a previous paper (Svihla 1959).

The dates of emergence in this particular locality vary, for in 1958 exuviae were found here as early as July 8th whereas on the same day in 1959 the site was still covered with several feet of snow. When the site was first visited on June 29, 1959, the entire basin was covered with about four feet of snow and the water of the lake was just appearing through the melting snow. Normally the melting of the snow takes place rapidly at this time of the year but it was only on July 20th that the habitat of the nymphs was completely uncovered. There was no question as to the presence or activity of the nymphs for one was seen half-way out of its burrow and many of the other burrows had fresh debris at their mouths. Some of the nymphs were removed from their burrows and examined. At this time apparently in preparation for emergence and transformation, the light colored thorax becomes visible through the nymphal case. However, no exuviae were seen although diligent search was made. Tracks of an American black bear were seen going up the streamlet where the nymphs occur but there was no indication that it molested the nymphs or was even aware of their presence.

When the site was again visited on July 29th, which was a bright sunshiny day with little wind, three exuviae were collected and a recently emerged teneral was seen at 10:30 A.M. At the time of discovery the teneral was about three inches above its case which was attached to the base of a plant of *Carex ablata*. The abdomen was still soft and moist but the wings

were fully formed and outstretched. From detailed observations made on emergence and transformation of other imagines of the same species, this particular individual must have emerged about an hour and a half earlier or at about 9:00 A.M.

The following day, July 30th, the spot was again visited and on arrival at 9:45 A.M. a recently emerged teneral was found. Further search brought to light two other recently emerged tenerals in the vegetation. This was apparently "The Day," for nymphs were seen to emerge and transform from that time on until early afternoon.

The nymphs of this species, at the time of emergence, do not travel more than six inches from their original home and the exuviae are found mostly at ground level or a few inches at most up the stems of neighboring plants. One nymph was observed to transform while its abdomen was still in water. This species differs from *Petalura gigantea* (Tillyard, 1917) and *Uropetala carovei* (Wolfe, 1953) in this respect, for both of these species are known to travel some distance and climb a foot or more up reeds and grasses in order to transform.

Tillyard (1917) states that the emergence of *Petalura gigantea* takes place at dawn. Wolfe (1953) found that in *Uropetala carovei* emergence also occurs in the early morning or at dawn.

In *Tanypteryx hageni* emergence also takes place early in the morning but is not restricted to this time for several were observed to emerge, transform and fly away in the early afternoon.

The details of emergence and transformation in the *Petaluridae* have been excellently described by Tillyard (1917) for *Petalura gigantea.* Wolfe (1953) states that emergence and transformation in *Uropetala carovei* does not differ from *Petalura gigantea.* These acts are essentially the same in *Tanypteryx hageni* but there are a few differences. For example, Tillyard (1917) states that "in *Petalura* and in most *Aeschninae* the abdomen is already of considerable length, and reaches its full extent before the wings have completed their growth." Wolfe (1953) states that emergence and transformation in *Uropetala carovei* does not differ from *Petalura gigantea.* One may therefore assume that the abdomen of the New Zealand

species also reaches its full length before the wings expand although Wolfe did not specifically say so. Tillyard states further that in other dragonflies "the abdomen usually completes its lengthening after the wings are fully expanded." *Tanypteryx hageni* differs from both *Petalura gigantea* and *Uropetala carovei* in that the lengthening of the abdomen takes place after the wings are fully formed rather than before.

Tanypteryx hageni also differs from these two species in the time of the development of the color pattern. In *Petalura,* Tillyard says that "by the time the abdomen becomes fully expanded the color is very vivid, rich brown and pale yellow. As the insect matures, the colors become duller, the yellow markings finally turning greyish." In *Tanypteryx hageni* the reverse is true, for in the recently transformed teneral, the top of the head and the entire dorsal part of the thorax are white. The adult black coloration is assumed gradually only after the tenerals have been transformed for some time. The stigmata and legs are light brown and become black only after several hours of exposure. At the time of the first flight of the teneral the color pattern is black and white. The adult yellows apparently appear much later, possibly days or weeks after emergence, for I have collected adults at Swim, Oregon, still in the black and white coloration.

The following account records the sequence of changes which take place during emergence and transformation.

After the nymph had emerged from its burrow and attached itself with its head upward to the base of a *Carex ablata* plant, it rested for some time.

11:30 A.M. Nymph attached to base of *Carex ablata.*
11:44 A.M. Thorax of case split on mid-line up to head.
11:50 A.M. Case split at right angles in head region through eyes; thorax of teneral pushing through case.
12:05 P.M. Head and thorax coming out of case; top of head and thorax white.
12:10 P.M. Head and thorax out of case; legs out, legs light brown in color.
12:15 P.M. Abdomen wide and thick, still halfway in case.
12:20 P.M. Head and thorax bent over backwards; abdomen still in case.

12:25 P.M. Almost completely out of case; legs hold onto *Carex* leaves.
12:30 P.M. Teneral completely emerged; wings small and crumpled, smoky in color and extending down to third abdominal segment.
12:45 P.M. Wings completely expanded, extending half inch beyond tip of abdomen, still cloudy in appearance; thorax still white; legs brown; abdomen brown.
12:50 P.M. Abdomen thickening laterally.
1:05 P.M. Abdomen lengthening and now as long as wings which are still cloudy.
1:10 P.M. Abdomen inflated and swollen, tergites and sternites circular in cross-section; wings becoming metallic and clear; abdomen longer than wings; white color of head and thorax becoming darker; abdomen becomes darker.
1:20 P.M. Abdomen changing shape, from circular to flattened; abdomen becoming darker but not yet black.
1:30 P.M. Abdomen tip darker than anterior portion; tergites of abdomen round, sternites flattened; wings now clear.
1:37 P.M. Wings expanded laterally for first time and quivering; thorax, head and abdomen black and white; abdomen normal adult shape but still inflated.
1:39 P.M. First flight of about three inches, landed on ground, wings expanded laterally as in adult.
1:41 Climbed up a plant two inches above ground and rested with wings folded together.
1:46 P.M. Resting with wings folded together; entire body quite black in color, legs black; eyes brown.
1:49 P.M. Abdomen becomes noticeably thin.
1:55 P.M. Wings extended laterally and fluttering; flew four inches, landed in streamlet, climbed up grass.
2:05 P.M. Flew away with a weak fluttering flight assisted by wind.

From the first spitting of the thorax to the time the teneral flew away was approximately two hours and twenty minutes.

Emergence and transformation may not always be successful for one teneral was found dead with only the head and part of the thorax out of the nymphal case. Another teneral was found in the black and white coloration of the young adult with its abdomen fully extended but the wings, which were clear, were only partially inflated and expanded. There is very little likelihood that this teneral would have survived very long.

Tillyard (1911) found that the caudal plates in *Petalura gigantea* were separated in the exuviae and he suggested from this that when about to emerge the nymph of this species keeps the rectum open for air-breathing. Wolfe (1953) examined two thousand exuviae of *Uropetala carovei* and found in every case that the caudal plates were firmly closed. He concluded that respiration is probably entirely spiracular and not rectal when the nymphs of *Uropetala* are about to emerge.

An examination of thirty exuviae of *Tanypteryx hageni* showed that this species is similar to *Petalura gigantea* in this respect for every exuviae had the caudal plates open.

Two exuviae of *Tanypteryx pryeri,* the Japanese species (kindly sent me by Syoziro Asahina) which were examined, showed that in this species the caudal plates were also open.

A single exuviae of *Tachopteryx thoreyi,* our eastern United States species (kindly sent me by Minton J. Westfall, Jr.) also had the caudal plates open.

Preserved specimens of the last instar nymph of *Tanypteryx hageni* all had the caudal plates open. Live specimens of this species, when examined, also had the caudal plates open. Svihla (1959) reported on air-breathing in the nymphs of this species. It appears, therefore, that with the exception of *Uropetala carovei,* respiration in the nymphs of the other species may be rectal rather than spiracular.

A total of 20 exuviae were collected from this site in 1959, 11 males and 9 females. Although the first three exuviae found on July 29 were males those found on July 30 consisted of 8 females and 5 males. The last exuviae found on August 28, were 3 males and 1 female.

Literature Cited

Svihla, A., 1959. Life history of *Tanypteryx hageni* Selys (Odonata). Trans. American Entomological Soc. 85: 219–232.

Tillyard, R. J., 1911. Further notes on *Petalura gigantea.* Proc. Linn. Soc. N. S. W. 36(1): 86–96.

——, 1917. Biology of Dragonflies. Cambr. Univ. Press.

Wolfe, L. S., 1953. A study of the genus *Uropetala Selys* (order Odonata) from New Zealand. Trans. Royal Soc. of New Zealand 80: pts. 3 and 4, 245–275.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nichiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

Phasmidae of nearctic area desired alive. Purchase or trade, drawing on large stock of major orders, worldwide. Domminck J. Pirone, Dept. Entomology, Cornell University, Ithaca, N. Y.

Nitidulidae and Rhizophagidae wanted in exchange for European beetles of all families. O. Marek, Zămberk 797, Czechoslovakia.

Wanted and Needed. We are compiling a history of entomology, and particularly, at present, of the amateur insect clubs that flourished 50 to 75 years ago. Will you who have knowledge of such early clubs or societies advise me, giving facts on the time of existence, members, etc., which you may have. J. J. Davis, Dept. of Entomology, Purdue University, Lafayette, Indiana.

Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

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